

STUDY UNIT DESCRIPTION

Faculty of Mechanics and Machine-Building

CODE

TITLE Applied Mechanics

LEVEL 2-nd Year in Modular Underground Course

ECTS CREDITS 4

DEPARTMENT Structural, Theoretical and Applied Mechanics

DESCRIPTION **Part I Theory of Mechanisms and Machines.** Simple Mechanisms. Kinematic Link. Types of Links. Kinematic Pair. Classification of Kinematic Pairs. Mechanism. Number of Degrees of Freedom for Mechanisms. Inversion of Mechanisms. Structural Analysis of Mechanisms. Kinematic Analysis of Mechanisms. Force Analysis of Mechanisms. Balancing. Belt, Rope and Chain Drives. Toothed Gearing. Gear Trains. Brakes. Clutches.
Part II Fundamentals of Strengths of Materials. Analysis of Internal Forces. Stress. Axially Loaded Bars. Procedure for Stress Analysis. Shear Stress. Strain. Statically Indeterminate Problems. A Review of Properties of Plane Areas. Torsion. Shear Force and Bending Moment in Beams. Stresses in Beams. Deflection of Beams.

Study-unit Aims:

Engineering Diploma Holders often come across various mechanical systems, particularly mechanisms and structures in practice. They should be able to analyze, identify and interpret various structures, mechanisms and machines and estimate their strength in day-to-day life. In maintaining various machines, a diploma technician should have sound knowledge of fundamentals of machine and mechanism and strength of materials. Technician must understand the mechanisms from operational point of view in better way. This subject imparts the facts, concepts, principles, procedure, kinematics, dynamics and strength involved in different machine elements and structures.

Learning Outcomes:

1. Knowledge & Understanding:

The learner should able to

Determine degrees of freedom for a link and kinematic pair, describe kinematic pair and determine motion;

Distinguish and categories different type of links, know inversions of different kinematic chains;

Understand utility of various mechanisms of four bar kinematic chain;

Make structural, kinematic and dynamic analysis of mechanisms;

Know terminology of cams, gears, brakes and clutches;

Know classification of followers and cams;

Define and analyze internal forces, stresses and strains in the simplest structures and machine elements.

2.Skills:

Understand working of the plane mechanisms, gear trains, cams, clutches and brakes;

Make structural, kinematic and dynamic analysis of mechanisms;

Analyze balancing of rotating masses;

Compare various power transmission devices;

Appreciate the strength of the simplest machine elements and structures;

Design the safe elements of structures under axial loading, torsion and bending.

Main Text/s and supplementary readings:

1. Shigley J.E. and Uicker J.J., "Theory of Machines and Mechanisms", McGraw Hill, Inc.
2. Hartenberg and Denavit, "Kinematic Analysis and Synthesis of Mechanisms".
3. Wilson, C E Sandler, J P "Kinematics and Dynamics of machinery", Pearson Education.
- 4 Khurmi, Gupta Theory of machines Eurasia publishing House Pvt. Ltd. 2006 edition
5. I.I. Artobolevsky (1976), Lever mechanisms (translated by Nicholas Weinstein), Moscow MIR Publishers.
6. Pytel A., Kiusalaas J., Mechanics of Materials, Second Edition, Cengage Learning 200 First Stamford Place, Suite 400 Stamford, CT 06902, USA
7. Nash, William A., Theory and problems of strength of materials / - 4th ed., McGraw-Hill

ADDITIONAL NOTES

and Programming.

Pre-requisite Study-units: Higher Mathematics, Theoretical Mechanics,

STUDY-UNIT TYPE

Lecture and Tutorial

METHOD OF ASSESSMENT

10% Home assignments; 10% Mid-term test; 20% Oral examination; 60% Final-term examination. 100% Total.